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10/600,701	06/23/2003	Richard Newton Hill JR.		5740

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GETTYSBURG, PA 17325

EXAMINER
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FREAY, CHARLES GRANT

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PAPER

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10600701	6/23/03	HILL, RICHARD NEWTON	

RICHARD NEWTON HILL, JR.  
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**EXAMINER**

Charles G. Freay

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**Commissioner for Patents**

Attached please find a translation of EP 0 875 257 A1. It is eleven pages in length.

Any inquiry concerning this communication should be directed to Charles G. Freay at telephone number 571-272-4827.

Charles G Freay  
Primary Examiner  
Art Unit: 3746

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L1: Entry 1 of 1

File: DWPI

Nov 4, 1998

DERWENT-ACC-NO: 1998-559211

DERWENT-WEEK: 199904

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TITLE: Reciprocating pump for breast-suction appliance - has elastic seal with piston shaft placed on front end and movable backwards and forwards between two end-stops

INVENTOR: HUBER, T; MOSER, B

PRIORITY-DATA: 1997EP-0107060 (April 29, 1997)

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## PATENT-FAMILY:

	PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
<input type="checkbox"/>	<a href="#">EP 875257 A1</a>	November 4, 1998	G	008	A61M001/06
<input type="checkbox"/>	<a href="#">JP 10295806 A</a>	November 10, 1998		005	A61M001/06

INT-CL (IPC): A61M 1/06

ABSTRACTED-PUB-NO: EP 875257A

BASIC-ABSTRACT:

The connection (12) for the suction cap opens into the base (11) of a cylinder (10). The cylinder's end has an air-removal hole. A rubbery, elastic seal (19) with a piston shaft (13) is placed on the front end. The piston shaft moved backwards and forwards between two end-stops (14,15;14',15') restricting the stroke and the vacuum level being produced.

The cylinder has a radially inward-pointing cam (18) co-operating with one of the guide-grooves (16) of various lengths distributed around the periphery of the piston shaft. During operation, air escapes through a vent hole(20).

ADVANTAGE - The vacuum level or suction can be adjusted per stroke. Provides adjustable or selectable stroke limit.

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The available invention concerns a piston pump for a chest suction mechanism, with a cylinder, from whose sole a connection for an exhaust hood flows and is intended at its rear end a ventilation hole, furthermore with a piston shaft also at the front end of put on, elastic seal, which is in the cylinder between two the stroke and thus the vacuum level limiting final notices which can be produced movable.

Such, piston pumps which can be operated usually manually are well-known and beside complex electrically operated exhaust pumps well proved.

Adjusting the desired vacuum level takes place thereby purely intuitively via more or less large strokes. This procedure depends strongly on the skill the pump operating person and thus at least not very comfortable.

Task of the available invention was it now, with a piston pump of the initially described kind with the structure of the pump with appropriate, simple means an adjustableness of the vacuum level and/or. to create suction power per stroke, by a selectable and/or. adjustable stroke limiter to plan is.

This task was solved according to invention with a piston pump of the initially defined kind by the characteristics in accordance with the characteristic part of requirement 1.

This construction makes possible by simply rotating of the piston shaft concerning the cylinder to adjust under expenditure an only small one Kraft, desired suction power.

Special execution forms of the invention article are defined in the dependent requirements.

The invention is more near described below on the basis remark examples some more represented in the design. Show:

Fig. 1 a total view of a chest suction mechanism with separately from the exhaust hood arranged piston pump;  
Fig. 2 a chest suction mechanism with directly pump arranged at the exhaust hood;  
Fig. 3 and 4 purely schematically a pump according to invention in the position after the Saughub and/or. directly before the Saughub;  
Fig. 5 according to invention trained a piston shaft in the profile;  
Fig. 6 a cross section by the line VI-VI von Fig. 5;  
Fig. 7 a profile by a pump cylinder;  
Fig. 8 a cross section by the line VIII VIII of Fig. 7;  
Fig. 9 on the cylinder after Fig. 7 of put onable Ringsegment with notice cams;  
Fig. 10 an opinion from downside on the Ringsegment of Fig. 9;  
Fig. 11 according to the Fig. 4, a variant of a pump according to invention and  
Fig. 12 a cross section by the piston shaft of Fig. 11, along the line XII-XII.

Fig. 1 of the design shows a chest suction mechanism, with exhaust hood 1 and onto screwed bottle 2 which over a Verbindungsschlauch 3 to a piston pump according to invention 4 with adjustable vacuum level is attached. The pump 4 consists movable piston shaft 6 of a cylinder 5 and one in it. The slots 7 on the piston shaft, important for the adjustableness, 6 are further down still more near described. The pump 4 is in a table mounting plate 8 removable (catchable) fastened.

Fig. a similar mechanism shows 2 as Fig. 1, however with directly 1 pump 4 installed at the suction mechanism.

Fig. 3 and 4 shows purely schematically according to invention developed a piston pump: In the cylinder 10, made of whose sole 11 a connecting connection 12 flows to an exhaust hood (not shown), a piston shaft can do 13 between two final notices 14, 15 and/or. 14', 15' be moved back and forth. The latters are formed at the ends of longitudinal slots 16, 17 on the shank surface, whereby radially inward a notice cam 18 in the slot 16 rising up at the cylinder 10 more attached, is led and the movement (stroke) limited.

The piston shaft 13 carries a seal 19 from elastic material (e.g. Silicone).

At the rear end and/or. in the rear range of the cylinder a ventilation hole 20 is intended: If from the position in accordance with Fig. 3 the piston (with put on exhaust hood), compressing air is moved to the left over the seal 19 will escape itself. With the actual Saughub, i.e. the piston movement from Fig. to the right, air escapes from 4 by the ventilation hole 20.

At the extent of the piston shaft 13 are several, e.g. six, slots of 16 etc. arranged, whereby exhibit this different length. By bringing in the notice cam 18 into one of the slots thus the stroke and thus the desired vacuum level can be adjusted. The attitude takes place via twist of the piston shaft 13 concerning the cylinder 10. This e.g. becomes. thus it makes possible that the notice cam 18 back-yields flexibly and always engages into the headed for slot.

Fig. 5 shows a piston shaft 20 on average and in the detail. At the shank 20 still another operating grasp 22 is installed beside the seal 21.

Like in particular from Fig. 6 comes out, is intended 28 of different length with the example shown six slots 23 -, which permit an adjusting of six different suction stroke lengths.

Fig. 7 and 8 shows the pump cylinder in the detail. The cylinder 30 exhibits an extent groove 32 at the rear end beside the ventilation hole 31 in particular, in which three depressing openings 33, 34, 35 is intended (see Fig. 8), which the admission of the Ringsegmentes 36 in accordance with Fig. 9 and 10 serves.

This springy Ringsegment 36 carries 37 still two small cylindrical increases 38, 39 beside the actual notice cam. The cam 37 will rise up by the opening 33 inward into one of the shank slots, while the increases prevent 38, 39 in the openings 34, 35 to intervene and with the Auffedern of the Ringsegments 36 (when adjusting the pump) this from it to away-jump.

Fig. 11 and 12 shows a variant of the pump according to invention. A piston shaft 41 is led also here in a pump housing 40. In place of the guide grooves combs 42, 43 different long are intended for stroke control with this variant. In place

of the notice can here the selected comb 42 spreading handle 44 is intended, which can be brought at the front end of the piston shaft 41 by rotating the latter on the comb with the desired length (stroke limiter). At the rear end of each comb 42, 43 this is easily widened under education of a notice 42 ' for the handle 44.

1. Piston pump for a chest suction mechanism, with a cylinder, from whose soll a connection for an exhaust hood flows and is intended at its rear end a ventilation hole, furthermore marked by a piston shaft also in the front end of put on, elastic seal, which is in the cylinder between two the stroke and thus the vacuum level limiting final notices which can be produced movable, by the fact that for stroke limiter at the cylinder radially inward a rising up subsequent organ is intended and at the extent of the piston shaft distributes several lengthwise-running guidance by different in each case length is intended and the subsequent organ cooperates with one of the guidance, whereby adjusting the desired stroke the piston shaft relative to the cylinder rotably and thus the subsequent organ with any selectable Guidance in effect connection is bringable.
2. Piston pump according to requirement 1, by the fact characterized that the guidance are designed as combs and the subsequent organ the selected comb spreads handle-like.
3. Piston pump according to requirement 1, by the fact characterized that the guidance are designed as slots and are trained the subsequent organ as into the selected groove of decisive notice cams.
4. Piston pump according to requirement 3, by the fact characterized that the notice cam is arranged flexibly springily in the cylinder wall.
5. Piston pump according to requirement 3, by the fact characterized that the notice cam rises up on a flexibly bendable Ringsegment arranged and touched down on the cylinder by a passage inward into one of the slots.
6. Piston pump after one of the requirements 1 to 5, by the fact characterized that it is directly connectable to an exhaust hood.
7. Piston pump after one of the requirements 1 to 5, by the fact characterized that it is fastenable in a table mounting plate and the connection is made to the exhaust hood by a Verbindungsschlauch.

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**CLAIMS**

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**[Claim(s)]**

[Claim 1] The cylinder which connection of a suction hood carried out the opening to the bottom, and prepared the exhaust port in the back end, In the piston pump of the bust suction unit which has the piston shaft which moved reciprocally between two end Stoppa who limits within a cylinder a stroke and the vacuum level formed by this, and equipped the front end with elastic packing The flattery mechanism which projects to the method of the inside of a radial direction for stroke restrictions is prepared in the cylinder. A flattery mechanism has two incomes with a guide, and to a cylinder, two or more guides prolonged to the lengthwise direction where length differs make it distributed over a piston peripheral surface, and have prepared in it, since it is regulation of a desired stroke, can carry out the relative rotation of the piston shaft, and in this way The piston pump of the bust suction unit characterized by the guide which a flattery mechanism can choose arbitrarily and operation combination being possible.

[Claim 2] The piston pump of the bust suction unit according to claim 1 characterized by covering the projection which the guide was constituted as a projection and the flattery mechanism chose.

[Claim 3] The piston pump of the bust suction unit according to claim 1 characterized by constituting a guide as a slot and being constituted as a contact projection which engages with the slot which the flattery mechanism chose.

[Claim 4] The piston pump of the bust suction unit according to claim 3 characterized by having prepared the contact projection in the cylinder wall free [ movement ] elastically.

[Claim 5] The piston pump of the bust suction unit according to claim 3 characterized by having prepared the contact projection in the annular segment which bends elastically, appearing on a cylinder, and projecting in one slot of an inner direction through a penetration mouth.

[Claim 6] The piston pump of the bust suction unit according to claim 1 to 5 characterized by

the ability of a piston pump to connect with a suction hood directly.

[Claim 7] The piston pump of the bust suction unit according to claim 1 to 5 characterized by for a piston pump being able to fix to a table holder and making connection to a suction hood through a connection hose.

## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] The cylinder which connection of a suction hood carried out the opening of this invention to the bottom, and prepared the exhaust port in the back end, Between two end Stoppa who limits within a cylinder a stroke and the vacuum level formed in this way is moved reciprocately, and it is related with the piston pump of the bust suction unit which has the piston shaft which equipped the front end with elastic packing.

[0002]

[Description of the Prior Art] The good thing is proved with the expensive suction pump operated that this kind that generally operates by manual operation of piston pump is well-known, and electrically.

[0003] In this case, regulation of a desired vacuum level is only sensuously performed by large stroke movement anyway. It depends to the level of skill of a pumping mode member strongly, therefore this disposal does not have no as it is convenient at least enough.

[0004]

[Problem to be solved by the invention] There is a technical problem of this invention in realizing regulation possibility of a vacuum level or the suction capability per stroke by composition of the pump which established the stroke restriction mechanism in which selectable \*\*\*\* regulation of structure is possible, corresponded and was equipped with the easy means in the piston pump of the bust suction unit of the kind stated to the beginning.

[0005]

[Means for solving problem] This technical problem is solved according to the feature of an indication in the piston pump of the bust suction unit of the kind stated to the beginning by Claim 2 or the feature written portion of 7 subordinate to Claims Claim 1 and the same clause.

[0006] In this composition, it can adjust in desired suction capability by only rotating a piston shaft about a cylinder using slight power.

[0007] Invention concerning the form of special operation of this invention was shown in the subordinate claim.

[0008]

[Mode for carrying out the invention] With reference to Drawings, the form of operation of this invention is explained in detail below. The bust suction unit which has the bottle 2 connected to



the piston pump 4 which is screwed on the suction hood 1 and this suction hood, and is applied to this invention with a variable vacuum level through the connection hose 3 at drawing 1 is shown. A piston pump 4 consists of a piston shaft 6 which moves the inside of a cylinder 5 and said cylinder reciprocately. An important slot is explained in detail below about the changeability prepared in the piston shaft 6. The piston pump 4 is attached to the table holder 8 free [ attachment and detachment ] (snap Inn). Although it was similar to drawing 1 , the equipment of the form which attached the pump 4 to the suction unit 1 directly was shown in drawing 2 .

[0009] The piston pump applied to drawing 3 and drawing 4 at the embodiment of this invention is shown typically. The piston shaft 13 can move reciprocately the inside of the cylinder 10 to which the cylinder bottom 11 was made to carry out the opening of the terminal area 12 which results in a suction hood (not shown) between two end Stoppa 14, 15; 14', 15', etc. It has formed in the slot 16 of the lengthwise direction of the piston shaft surface, and the end of 17 grades, the contact projection 18 which is installed in a cylinder 10 in this case, and projects to the method of the inside of a radial direction is introduced in slot 16 grade, and said end Stoppa restricts movement (stroke). The packing 19 which consists of an elastic rubber-like material (for example, silicone) is formed at the tip of the piston shaft 13.

[0010] The exhaust port 20 is formed in the back end or the rear range of a cylinder. If a piston is moved to a left from the position of drawing 3 , compressed air will escape through packing 19 (when a suction hood is carried). Air escapes through an exhaust port 20 at the time of the original suction stroke from drawing 4 to the method of the right, i.e., a piston action.

[0011] The slot 16 of two or more lengthwise directions (for example, six) and 17 grades make it distributed over the peripheral surface of the piston shaft 13, and it has prepared in it. In this case, the length of a slot differs mutually. That is, a stroke, i.e., a desired vacuum level, can be adjusted by introducing the contact projection 18 in one slot. This regulation is performed by rotating the piston shaft 13 to a cylinder 10. This can retreat the contact projection 18 elastically and can be realized by making it always engage with a desired slot, for example.

[0012] The detailed sectional view of a piston is shown in drawing 5 . In addition to the packing 21 at a tip, operation Toride 22 is attached to the piston shaft 20.

[0013] Six slots 23-28 from which the length which can adjust in the case of the form of implementation of illustration (for example, six different stroke length) differs are provided in the piston shaft 20 so that especially clearly from drawing 6 .

[0014] A pump cylinder is shown in drawing 7 and drawing 8 in detail. The peripheral surface slot 32 which formed three penetration openings 33, 34, and 35 (refer to drawing 8 ) which are useful for acceptance of the annular segment 36 (shown in drawing 9 and drawing 10 ) is formed in the back end of the cylinder 30 near the exhaust port 31.

[0015] Two cylindrical shape upheaval 38 and 39 is further formed in this elastic annular

segment 36 in addition to original contact projection 37. The contact projection 37 is projected in the shaft slot of the cylinder of an inner direction through the penetration opening 33, and another side and upheaval 38 and 39 engage with the penetration openings 34 and 35, and prevent \*\*\*\* of said segment at the time of extension of the annular segment 36 (at the time of pump regulation).

[0016] The form of other operations of the pump applied to this invention at drawing 11 or drawing 14 is shown. Also in this case, the piston shaft 41 is guided into a cylinder 40. In the case of the form of this operation, the projection 42 which length differs and has bulge part 42' in the back end (right end in drawing 11 ) instead of the guidance slot of the form of the aforementioned operation and which is mutually parallel is formed in the direction of an axis of the piston shaft 41 for stroke regulation. moreover, instead of [ of a contact projection of the form of the aforementioned operation ] -- said two or more projections 42 -- [ the bracket 44 with two fingers which project toward the method of the inside of the radial direction which can cover either as which ... was chosen ] It is prepared in the position (right end slippage in drawing 11 ) of back end slippage where the piston shaft 41 of a cylinder 40 is inserted.

[0017] As said cylinder 40 is a product made from a plastic and is shown in drawing 14 It consists of two portions 51 and 52, and the gap of the direction of a circumference in the position of back end (right end in drawing 14 ) slippage of a cylinder 40 is prepared between said portions 51 and 52, the connection member 40a is fixed mutually and said portions 51 and 52 form the cylinder 40 by it.

[0018] The ring 50 equipped with the bracket 44 with two fingers which project toward an inner direction made from a plastic is attached to the cylinder 40 removable so that said gap of a cylinder 40 may be covered. Two fingers of this bracket 44 can cover now either of said two or more projections 42 to an arc shape.

[0019] moreover, [ the tip part (left end in drawing 11 ) of the piston shaft 41 ] The elastic packing 45 which touches the inner circumference of a cylinder 40 is attached, the color C in contact with the inner circumference of a cylinder 40 is formed in the portion immediately behind this packing 45, and the slot G of the direction of a circumference is further formed behind the color C. Said two or more projections 42 are formed in the direction of an axis of a piston 40 by using near the back end part of Slot G as a tip, and as the tip is on the same circumference as the external surface of a color C, they are constituted by the portion of the piston of a byway a little.

[0020] By inserting the portion at the tip of a piston 41 into a cylinder 40 first, and putting Slot G on the position of a ring 50 with the form of this operation constituted as mentioned above You can rotate a piston 41 within a cylinder 40, without being blocked by the bracket 44 which projects in the inner direction of a ring 50, and can make it located so that a bracket 44 can cover the desired projection 42. If a piston 41 is moreover further inserted into a cylinder 40,

when a bracket 44 covers the desired projection 42 and engages with this projection, a piston 41 can be moved in the direction of an axis of a cylinder 40.

[0021] In this state, when a piston 41 moves toward the method of the outside of the direction of an axis of a cylinder 40, the color C of a tip part contacts two fingers of a bracket 44, and movement of the piston 41 beyond it is barred. When a piston 41 moves toward the method of the inside of the direction of an axis of a cylinder 40 on the contrary, bulge part 42' of the back end of the projection 42 covered with the bracket 44 contacts two fingers of a bracket 44, and movement of the piston 41 beyond it is barred.

[0022] moreover, to change the stroke of a piston 41 as one projection 42 of a request of a bracket 44 is covered as mentioned above, after operating a piston pump By rotating the upper piston 41 pulled out until the color C contacted two fingers of a bracket 44 in the piston 41 within the cylinder 40 so that the slot G of a piston 41 might be put on the position of a ring 50 You can make it located so that a bracket 44 can cover the projection 42 of a request of everything but a piston 41.

[0023] Thus, since two or more projections 42 have mutually different length by choosing the projection 42 of the cylinder 40 covered with two fingers of a bracket 44, regulation or restriction of a stroke of a piston 41 can be performed easily.

[0024]

[Effect of the Invention] Since this invention possesses the composition indicated to Claims 1 to 7 as explained above By easy composition, the stroke of the piston of the piston pump of a bust suction pump can be adjusted easily, and the vacuum level of this piston pump and the suction capability per stroke can be adjusted.

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[Translation done.]

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**DESCRIPTION OF DRAWINGS**

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**[Brief Description of the Drawings]**

[Drawing 1] It is the whole bust suction unit figure concerning the form of the operation of this invention which formed the piston pump separately from a suction hood.

[Drawing 2] It is the whole bust suction unit figure concerning the form of the operation of this invention which formed the pump in the suction hood directly.

[Drawing 3] It is the sketch (sectional view) showing typically the pump concerning the form of operation of this invention which is in a back position to a suction hood.

[Drawing 4] It is the sketch (sectional view) showing typically the pump concerning the form of operation of this invention which is in the last position to a suction hood.

[Drawing 5] It is the longitudinal section of the piston shaft in the form of operation of this invention.

[Drawing 6] It is a transverse cross section in alignment with line VI-VI of drawing 5.

[Drawing 7] It is the longitudinal section of the pump cylinder in the form of operation of this invention.

[Drawing 8] It is a transverse cross section in alignment with line VIII-VIII of drawing 7.

[Drawing 9] In the form of operation of this invention, it is the side view of the annular segment which appears on the cylinder which has a contact projection and is shown in drawing 7.

[Drawing 10] It is the top view of the annular segment shown in drawing 9.

[Drawing 11] They are the same Drawings as drawing 4 of the pump concerning the form of other operations of this invention.

[Drawing 12] Line XII-XII of drawing 11 It is the meeting sectional view.

[Drawing 13] It is the perspective view of the piston shaft in the form of operation shown in drawing 11 and drawing 12.

[Drawing 14] In the form of operation shown in drawing 11 or drawing 13, it is the explanatory view showing the state of forming a bracket with two fingers in a cylinder.

[Explanations of letters or numerals]

1 Suction Hood

3 Connection Hose

4 Piston Pump

5 Cylinder

6, 13, 20 Piston shaft

10 Cylinder

14, 15; 14', 15' End Stop

16, 17 Slot

18 Contact Projection

19, 21 Packing

20 Exhaust Port

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[Translation done.]